The Genus Montagnula Berl.[1])

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With plates XI—XII.

The genus *Montagnula* was described by Berlese (Icon. Fung. **2**: 68. 1900) for the two species *M. infernalis* and *M. gigantea,* in the following words "Perithecia plerumque in pustula foliorum tumidis solitaria vel stromata plus minusve evoluto immersa, globosa vel mutua pressione angulata, ostiolo minuto vex prominulo. Asci clavati, longe stipitati, paraphysati, octospori, Sporidia fusoidea, medio constricta, transverse pluriseptata, muriformia, muco obvoluta, colorata.

Est *Pleospora* stromatica ascisque long stipitatis."

From his description it is obvious that he considered the somewhat stromatic development and the stipitate asci the generic characters. The writer's studies in the genus *Pleospora* have revealed a group of species which have in common these and certain other characteristics. The characters common to this group are as follows: 1- the dark red color and strongly papillate surface, under oil immersion, of the spore wall; 2- the more or less stalked or tapered base of the ascus; 3- the presence of stromatic development or a blackened clypeus in some cases.

The species concerned are described below. Their relationships and the reasons for considering this group as a subgenus of *Pleospora* follow these descriptions. (The collection numbers are those of the writer's *Pleospora* slide collection.)

Pleospora bataanensis Petr.
Ann. Myc. **21**: 217. 1923.

Figs. 1 & 8.

Perithecia somewhat flattened, 200—300 μ in diameter, immersed just beneath the epidermis, scattered or in seriate lines, erumpent as small black papillate ostioles; wall rather thick (30—50 μ).

Asci clavate, wall slightly thickened, tapered below, but not stalked, 80—100 ⇌ 13—15 μ.

Spores biseriate, fusoid-ellipsoid, dark red-brown, with a finely papillate-tuberculate wall, 3-septate, with vertical septa in one or

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two of the central cells, constricted at the septa, ends bluntly rounded, sometimes slightly inaequilateral or curved, 17—20 ⇌ 7—8 μ.

Collection: 616. (Type), on *Agave centula,* Bataan Prov., Philippine Is., S. A. Reyes (Farl. Herb.).

Pleospora clypeata Wehm.
Mycol. **41**: 584. 1949.
Figs. 2 & 10.

Perithecia 300—400 μ in diameter, appearing upon the surface as thickly scattered, circular, black clypeate spots, immersed in the cortex and erumpent through the cuticle as short cylindric ostiolar necks; wall some 50 μ thick, composed of coarse, black-walled parenchyma, commonly splitting into two layers. There is also a ring-like clypeate stromatic blackening of the tissues, just beneath this cuticle (which remains hyaline) and around the ostiole, some 100 μ in thickness.

Asci numerous, long clavate, tapered toward the base, imbedded in numerous filiform pseudoparaphyses, 140—160 ⇌ 11—14 μ.

Spores biseriate above, uniseriate below, yellow-brown, 3-septate, with vertical septa in one or both central cells, wall finely papillate-tuberculate, mostly straight and symmetric, occasionally slightly inaequilateral or asymmetric, ends acutely tapered, constricted at the central septum, 23—26 ⇌ 7.5—9.5 μ.

Collections: 21. (Type) (sub *Pleospora thuemeniana*) N. Y. Bot. Gard., Ellis coll., no data given, on *Agave.*

Pleospora thuemeniana Sacc.
Michelia **2**: 139. 1880.
Fig. 14.

Appearing on the surface of the leaves as numerous circular to irregular spots, sharply margined by a black zone, or as a black spot with a small light colored center, caused by the adherence of the perithecium to the epidermis at its margin, and the separation of a small area of transparent epidermis in the center. Perithecia somewhat flattened, thick-walled, 300—400 μ in diameter.

Asci rather long cylindric-clavate, thick-walled above with a tapering claw-like base, 90—100 ⇌ 10—12 μ.

Spores biseriate above, uniseriate below, or overlapping uniseriate, fusoid- ellipsoid, 3-septate, with the wall rather coarsely papillate, yellow-brown, constricted at the central septum, with vertical septa in one or two central cells, ends rounded or tapered, 16—19 ⇌ 6—7 μ.

Collection: 1036. *Pleospora thuemeniana* Sacc., on *Yucca aloifolia,* North America, Ravenel (Saccardo Herb.) (Type).

Ravenel's type collection was issued in Thuem. Myc. Univ. 1846. The copies of this exsiccatus in the Riksmuseet and Farlow

Herbarium show only pycnidia 200—400 μ in diameter containing 2-celled, yellowish, ellipsoid conidia, 11—13 ⇌ 5—6 μ. The copy of Ravenel's collection in the Saccardo Herbarium, however, has spores and asci as given above. These spores are identical in shape and septation to those of *P. clypeata,* but run slightly smaller. The Saccardo collection also lacks the prominent clypeus of *P. clypeata.* Otherwise they might be considered the same.

Pleospora pertusa Sacc. et Cav.
Nuov. Giorn. bot. ital. **7**: 284. 1900.
Figs. 3 & 7.

Perithecia large, 500 μ in diameter, buried in the bark cortex, erumpent as a papillate ostiolar neck; wall rather thin, 20—30 μ thick, composed of flattened parenchyma.

Asci clavate, tapered below to a short stalk-like base, wall slightly thickened, and with numerous filiform pseudoparaphyses, 95—100 ⇌ 17—19 μ. Stipe 26—30 μ.

Spores biseriate above, uniseriate below, fusoid-ellipsoid, dark yellow-brown, 3-septate at first but soon with vulgaris-type septa in each central cell and often vertical, "Y"-shaped or transverse septa in the end cells, and then 5- to 7-septate, wall finely papillate-tuberculate, constricted at the central septum, straight, symmetric, ends bluntly tapered. 21.5—27 ⇌ 8.5—9.5 μ.

Collection: 1010. (Type) on *Buxus,* Vallambrosa, Italy, March, 1898 (in Saccardo Herbarium).

This collection in the Saccardo Herbarium has an almost illegible label, but it seems to be the type collection of this species.

Pleospora infernalis (Niessl) comb. nov.
Figs. 4, 9 & 13.

Syn.: *Leptosphaeria infernalis* Niessl Contr. Fl. Myc. Lusit. 13 (Istituto de Coimbra 31). 1883.
Pleospora pustula Berl. & F. Sacc. Rev. Myc. 1889: **5**. Plate 83.
Montagnula infernalis (Niessl) Berl. Icon. Fung. **2**: 69. 1900.

Perithecia globose, 300—400 μ in diameter, walls thick, 40—50 μ, often flattened and thickened on the upper surface, separately erumpent in swollen areas of the leaf, caused by a proliferation of hyphae within the cortex, or as scattered circular black spots with a light colored central area containing the erumpent papillate black ostiolar neck. The raised perithecial areas may appear brownish in color.

Asci clavate with a tapered base and a long filiform stalk, wall thickened, sp. p. 75—95 ⇌ 18—26 μ, stipe 28—35 μ long.

Spores biseriate, fusoid to ellipsoid, dark red-brown, 3-septate at first with a vertical septum in the central cells, finally with vulgaris-type septa in one or both central cells, and then 5-septate, wall

papillate-tuberculate, symmetric, straight or inaequilateral, constricted at the central septum, 22—27 ⇌ 7—10.5 μ.

Collections: 722. *Pleospora pustula* (Type) on *Fourcroya longeva,* Coimbra, Lusitania, (Myc. Lusit. 50, Farl. Herb.). 989. *Pleospora pustula,* on *Fourcroya gigantea,* Jard. Bot. Coimbra, Nov., 1905 (Moller). (Saccardo Herb.). 1002. *Pleospora infernalis* Niessl, Saccardo Herb., marked "Sr. Niessl orig.".

This is one of Berlese's original species of *Montagnula.* The collection (1002) marked "Sr. Niessl orig.", if not a portion of Niessl's type is at least the basis of Berlese's discussion and fits his figures (Ic. Fung. 2, Pl. 99). It also agrees with Niessl's description of *Leptosphaeria infernalis* except for the lack of mention of vertical walls in the central cells. These are often faint and difficult to see through the almost opaque cell walls and may very well have been overlooked by Niessl. Collection No. 722 is the type of *P. pustula* Berl. & F. Sacc. and is identical with the Niessl collection. No. 989, on *Fourcroya gigantea* has identical spores but the perithecia do not form a collective swollen pustule as in the other two cases mentioned, forming instead scattered circular blackened spots with a central light colored area through which the ostiolar neck is erumpent.

Pleospora opaca Wegelin.
Mitt. naturf. Ges. Thurgau **12**: 9. 1896.
Figs. 5 & 11.

Syn.: *Pleospora scabra* Mout. Bull. Soc. Roy. Bot. Belg. **39**: 48. 1900.
Phorcys eriophori Feltg. Vorst. Pilz. Luxemb., Nachtr. **3**: 162. 1903.
Pleospora feltgeni var. *eriophori* Feltg. Vorst. Pilz. Luxemb., Nachtr., **3**: 103. 1903.
Massariella eriophori (Feltg.) Sacc. Syll. Fung. **17**: 683. 1905.

Perithecia scattered, globose, 200—300 μ in diameter, separately erumpent as a short ostiolar neck (dark wine red in NaOH).

Asci clavate, tapered below or with a short salk, wall somewhat thickened, 100—120 ⇌ 26—30 μ.

Spores biseriate above, uniseriate below, fusoid-ellipsoid, dark red-brown, with a coarsely tuberculate outer wall, primary septum prominent, then 3-septate by faint secondary septa, and finally with faint vulgaris-type septa in the two central cells (sometimes with two transverse septa in these cells) and vertical or vulgaris type septa in the end cells, i. e. up to faintly 9-septate, straight, symmetric or inaequilateral, constricted at the central septum, with an apiculus on the upper cell, 25—39 ⇌ 12—14 μ.

Collections: 654. *Phorcys eriophori, on Eriophorum angustifolium,* Luxemburg, (Farl. Herb., ex Höhnel Herb.) (Type). 973. *Cla-*

thospora pyrenophoroides (Sacc.) Berl. on *Festuca arundinacea*, Augsburg, Oct. 1878 (Riksmuseet). 794. *Pleospora opaca* Weg. (Type) on *Phalaris*, Frauenfeld, Thurgau, Oct. 1892, H. Wegelin (Eidg. Hochsch. and Riksmuseet, sub *Clathrospora pyrenophoroides*). 983. *Pleospora opaca*, on grass stems, Graubünden, Minstertal July, 1951, E. Müller (Eidg. Techn. Hochsch.). 1039. *Pleospora scabra* Mount. (Type), on *Poa*, Beaufay, V. Mouton (Brussels Herb.).

This species occurs on various grasses. The two portions of the type of *P. opaca* (974) and that of *P. scabra* (1039) are itendical. The type (654) of *Phorcys eriophori* is also this same fungus, the septa laid down after the primary one are often faint and difficult to see through the almost opaque spore wall, which accounts for the placement of this species in two-celled genera. The tuberculae on the spores of this species are very coarse and often irregular in shape and approach the type of spore with "cracked" walls that are found in *Pleospora androsaces* and *P. phaeospora*.

Pleospora gigantea (Dur. & Mont.) Sacc.
Rev. Myc. **3**, 9: 28. 1881.

Figs. 6 & 12.

Syn.: *Sphaeria gigantea* Dur. & Mont. Fl. Algeries Pl. 26, fig. 3 (Ann. sci. nat. ser. **2**, 1: 304). 1845.
Montagnula gigantea (Dur. & Mont.) Berl. Icon, Fung. **2**: 69. 1900.

Perithecia globose to elongate, 400—600 ⇌ 400 μ, with a differentiated wall of more strongly crushed and flattened parenchyma, 30—40 μ thick, imbedded in a stromatic area of blackened host cells and closely interwoven fungus hyphae forming a swollen pustulate area 4—20 mm. in diameter beneath the cuticle which is blackened on the surface. Perithecia separately erumpent as papilate to punctate ostiolar necks.

Asci clavate, tapered to a stipe-like base, and with a thickened apical wall, 160 ⇌ 12—30 μ.

Spores overlapping biseriate above, uniseriate below, dark red-brown with a papillate-tuberculate outer wall, fusoid-ellipsoid, 7-septate, symmetric but inaequilateral or curved, tapered toward the ends, constricted at the middle and slightly so at the other septa, vulgaris type septa with 1—2 vertical septa in all four secondary cells, commonly with a gelatinous envelope around the spore 53—60 ⇌ 13—15 μ.

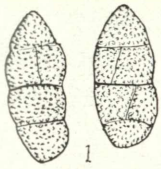
Collections: 765. *Sphaeria gigantea* Dur. & Mont. (Co-type), on *Agave*, Algiers (Kew Herb., ex Cooke Herb., ex Montagne Herb.). 766. *Sphaeria gigantea* (Co-type), on *Agave, Perpignan*, (Kew Herb., ex Berkeley Herb., ex Montagne Herb.).

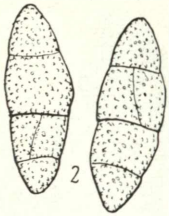
This is the second species placed in *Montagnula* by Berlese. The two collections (765 & 766) appear to be portions of the two co-types, and are identical with the description given. Montagne figures two-celled spores, but this is incorrect, and Berlese (Icon. Fung. 2, Pl. 100) figures the spores as given here.

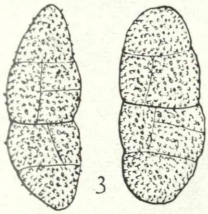
The species of this group form a continuous integrated series. All except *P. pertusa* (on *Buxus*) occur on Monocotyledons, on the leaves of either grasser or plants of the *Agave* type. *P. bataanensis* is the simplest one, with small, dark red-brown, 3-septate spores and no ostiolar or stromatic blackening. *P. clypeata* and *P. thuemeniana* have the same type of spore but are longer, narrower and yellow-brown. In *P. clypeata* there is a heavy stromatic clypeus about the ostiole, but in *P. thuemeniana* this is reduced to a slight backened ring where the perithecia abut upon the epidermis. All four of these species have asci which are short stipitate or merely tapered toward the base.

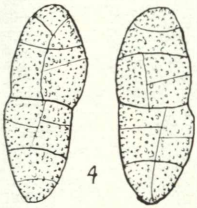
In *P. infernalis* the spores are of a similar type and red-brown, but there are often vulgaris type septa in one or both central cells, and there is some stromatic proliferation in the leaf cortex of fungus hyphae sometimes causing pustulate areas. In *P. pertusa* the spores are again similar, but they are yellow-brown and show vulgaris type septa in both central cells and commonly transverse or vulgaris type septation in the end cells. There is no stromatic development about the perithecia with no stromatic development. The spores again have three prominent septa, but faint vulgaris type septa may arise in any of the four cells so formed, but are difficult to see because of the almost opaque tuberculate wall. The spore wall in this species has very coarse tuberculae which are irregular in shape and approach the condition found in *P. androsaces* and *P. phaeospora,* where the thick wall shows an irregular network of cracks. *P. gigantea,* finally, has spores which are distinctly 7-septate and the perithecia are imbedded in a flat pustulate area richly penetrated by stromatic fungous hyphae.

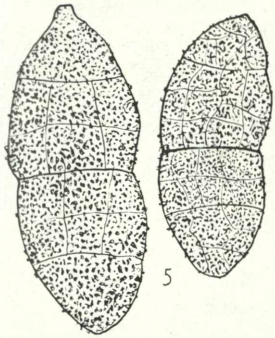
The question of the limits of this taxon and whether it should be considered of generic or sub-generic rank introduces the usual difficulties. The rather compact developmental series suggests generic rank. On the other hand the only character common to all the species is the papillate-tuberculate spore wall. Some species have and some lack stipitate asci, some have and others lack a clypeus or stroma, some have yellow-brown but most have red-brown spores. Again the tuberculate wall character grades off into other typical species of *Pleospora* as *P. andrasaces* and *P. phaeospora.* On the other hand there are other rather distinct developmental series which have been included in *Pleospora* (i. e. the *Scleroplea* (*Pyrenophora*) group). The vulgaris type of septation found throughout this *Mon-*

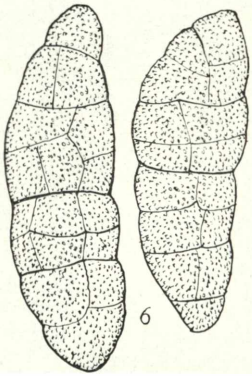


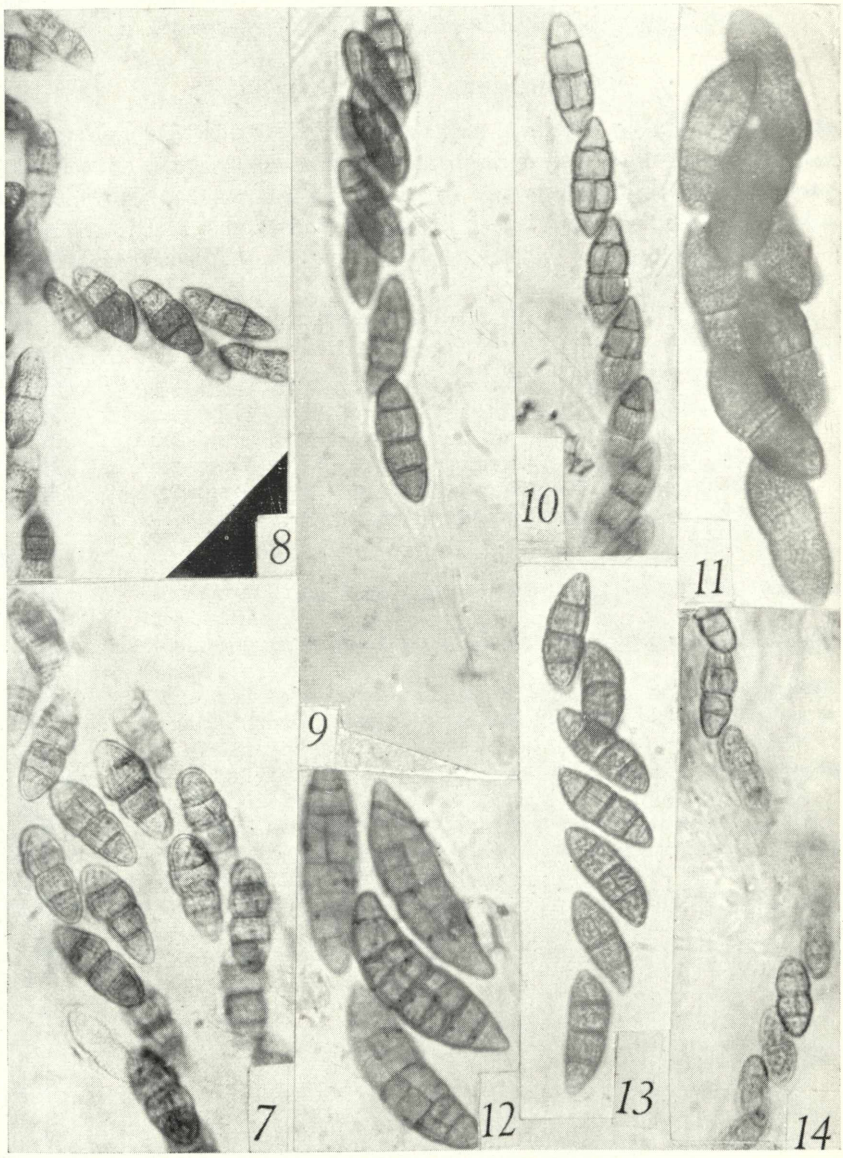












tagnula series is more typical of the genus *Pleospora* than the septation in the *Scleroplea* (*Pyrenophora*) series, for instance.

For the present, until the relationship of these various developmental series to one another and other related genera are better known, it seems more useful to retain the *Montagnula* series as a subgenus of *Pleospora* with the following designation.

Montagnula (Ber.) subgenus nov.

Perithecia of the ascostromatic type, scattered singly, or beneath a blackened clypeus or within a stromatic development of fungus hyphae. Asci clavate, bitunicate, wall somewhat thickened, tapered below or with a somewhat elongated stalk. Spores muriform with a papillate-tuberculate roughened outer wall.

Explanation of Plates XI—XII.

Plate XI.

Fig. 1. Ascophores of *Pleospora bataanensis* Petr.
Fig. 2. Ascospores of *Pleospora clypeata* Wehm.
Fig. 3. Ascospores of *Pleospora pertusa* Sacc. & Cav.
Fig. 4. Ascospores of *Pleospora infernalis* (Niessl) comb. nov.
Fig. 5. Ascospores of *Pleospora opaca* Wegelin.
Fig. 6. Ascospores of *Pleospora gigantea* (Dur. & Mont.) Sacc.

Plate XII.

Fig. 7. Ascospores from the type collection of *Pleospora pertusa* Sacc. & Cav.
Fig. 8. Ascospores from the type collection of *Pleospora bataanensis* Petr.
Fig. 9. Ascus and spores from the type collection of *Pleospora infernalis* (Niessl) comb. nov., showing the stipitate base of the ascus.
Fig. 10. Ascus and ascospores from the type collection of *Pleospora clypeata* Wehm.
Fig. 11. Ascus and ascospores of *Pleospora opaca* Wegelin.
Fig. 12. Ascospores from the type collection of *Pleospora gigantea* (Dur. & Mont.) Sacc.
Fig. 13. Ascus and ascospores from the type collection of *Pleospora pustula* Berl. & F. Sacc. (*P. infernalis*).
Fig. 14. Ascospores from the type collection of *Pleospora thuemeniana* Sacc.